REMARKS

Applicants note in the Office Action Summary Sheet that this Action is a Final Rejection. However, it is respectfully submitted that a Final Rejection of this Application is premature since Applicant had filed an Amendment which was not entered in the Application prior to the filing of the "Request for Continued Examination." Thus it is respectfully submitted that the Final Rejection should be withdrawn at this time. Confirmation of this fact is earnestly solicited by Applicants.

Applicants have amended claim 1 to correct an error wherein at line 4 the term volume should have been weight. This is supported in the specification at page 10 line 25.

The Examiner has rejected Claims 1, 3-29, 38 under 35 U.S.C. 112, first paragraph. In the response to the previous Final Rejection, which is now of record, Applicants put forth arguments concerning the inapplicability of this Rejection. Applicants submit that the Disclosure in the Specification filed as part of the original application papers fully supports subject matter in the claims in such a way to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Applicants once again refer to the arguments made in the Amendment filed under Certificate of Mailing dated December 22, 2004 in the application before the "RCE" and in particular or as is the Declaration under 37 C.F.R. 1.132 of Dr. Gilbert Gordon, a recognized expert in the field.

Contrary to the allegation by the Examiner, Dr. Gordon did not have to set forth facts or evidence other than to opine that as an expert the field, an expert position unchallenged by the Examiner, that in his opinion the Specification was complete and that based upon the information previously presented in the Specification and by applicants in response to the first Office Action prior to the RCE, that the applicants' Specification and Claims as originally filed

would reasonably convey to workers skilled in the relevant art and that at the time the application was filed, the inventors/applicants had possession of the claimed invention. Dr. Gilbert goes on to opine that a worker skilled in the art could determine the ratio of raw materials, size the reactor and control the rate of products without undue experimentation. Furthermore, he states "that a worker skilled in the art would be able to reproduce the invention without undue experimentation." The opinion of a recognized expert should be given great deference especially in view of the fact that there is no countervailing evidence put forth by the Examiner. The Examiner's supposition is based upon his understanding of the invention in the context of his level as an expert in the field which Applicants submit does not rise to the level of the expertise of Dr. Gordon.

In view of the foregoing it is respectfully submitted that the rejection of claims 1, 3-29, and 38 under 35 U.S.C. 112, first paragraph, is not well taken and should be withdrawn.

The Examiner has rejected claims 10, 16-17 and 21 under 35 U.S.C. 112, second paragraph.

In view of the Amendments to claims 10 and 21, it is respectfully submitted that the rejection of claims 10, 16-17 and 21 under 35 U.S.C. 112, second paragraph is not well taken and should be withdrawn.

The Examiner has rejected claims 1, 3 under 35 U.S.C. 102(b) and Bielz et. al. U.S. Patent 4,372,939. The exact ratio of reagents, the degree to which the reaction occurs in Reaction 1 or Reaction 2, and the resulting ratio of products, are functions of various parameters such as the geometry of the reactor, the mixing characteristics of the reactor, the temperature of the reactor, and the purity of the reagents (especially regarding chloride content of the chlorate). The present application (e.g. claims 20 and 24, among others) discloses and claims techniques for modifying the ratio of Reaction 1 to Reaction 2. Any given reactor can be operated to

produce a broad range of ratios between Reaction 1 and Reaction 2. That is one of the many salient teachings of the present invention.

Dr. Gordon's affirmation that the description of the process in the subject application is adequate to permit practice of the invention by one skilled in the art shows that the invention can indeed be practiced based on what is disclosed.

A specific example of how such a reactor functions, including mass balance, is set forth in Appendix A attached hereto and made a part hereof.

The key innovation that distinguishes the present invention from the prior art is in the fact that in the processes of the present invention the reactor is intentionally operated so that essentially all of the reagents that are fed to the reactor are consumed in the reactor in either Reaction 1 or Reaction 2. This is clearly distinct from the prior art which teaches (either implicitly or explicitly) that the reactions should be performed with an excess of chlorate ion so that most of the chlorate is consumed in Reaction 1 and the ratio of chlorine dioxide production to chlorate consumption is maximized. In order to do this, the prior art teaches that all reactions should be run in a chlorate-rich mode. Various patents in the prior art (including the cited Bielz Patent) describe processes for recycling the partially consumed chlorate stream.

None of the prior art describes adding enough acid to consume essentially all of the chlorate. The processes described in the prior art attempt to maximize Reaction 1. In fact, they define "efficiency" as the percent of the consumed chlorate that is consumed in Reaction 1. This is true also of the Bielz et. al. patent cited in the most recent office action. This is evidenced by the Statement in Column 1, lines 51-56 of the Bielz Patent, wherein patentee states that: "Reaction 2 is undesirable in principle because it does not produce chlorine dioxide, but it cannot be entirely suppressed. The chlorine dioxide reactor would have an efficiency of 100% if there were no reaction according to equation 2."

The primary focus of the Bielz et. al. patent is that the unwanted chlorine product stream is recycled to dilute the chlorine dioxide stream where the recycled chlorine serves instead of air to maintain chlorine dioxide concentrations below the explosive limit. Otherwise, the process described in the Bielz et. al. patent is very similar to much of the other prior art.

In the prior art, the product of the process(es) is chlorine dioxide or chlorine dioxide solution. This is true of the Bielz et. al. patent as well, where the product stream is chlorine dioxide solution withdrawn via conduit 12 and stored in tank 5 in the diagram. All of the chlorine is consumed in the processes of the prior art, usually by burning with hydrogen to produce acid. The Bielz patent even teaches that additional chlorine from extraneous sources can be added.

In sharp contrast, the present application teaches that the reagents should be controlled to bring combined Reactions 1 and 2 essentially to completion. As a result, the processes of the present invention are much less "efficient" as efficiency is defined in the prior art. This is acceptable and even desirable because applicants' have invented processes for mixed chlorine dioxide/chlorine blends with compositions similar to those produced in the processes of the present invention. The processes of the present invention produce a product that is a mixture of chlorine dioxide and chlorine. Applicants also teach ways to maximize rather than minimize chlorine production.

Regarding the Examiner's statement beginning on paragraph 2, page 4 of the Office Action, the citations from the Bielz et. al. patent make exactly the point made above. Bielz et. al. teach that the efficiency of the process depends on Reaction 1 and Reaction 2. He states that "normally reaction 1 predominates". This is not necessarily true in the process of the present invention. In fact according to the present invention applicants describe techniques for causing

Reaction 2 to predominate. This exhibits the clear difference between the prior art (including the Bielz et. al.) and the present invention.

In view of the foregoing it is respectfully submitted that the rejection of claims 1 and 3 under U.S.C. 102(b) is not well taken and should be withdrawn.

Claims 1-13, 21 and 38 stand rejected under 35 U.S.C. 103(a) under Bielz et. al. ('939) in view of Kesting U.S. Patent 2,664,341.

Regarding the rejection raised on page 5, paragraph 3 of the detailed action, the Bielz et. al. Patent, the Kesting Patent and a great deal of other prior art disclose processes for producing chlorine dioxide using solutions of chlorate and acid. None of the prior art discloses a process for carrying the reactions essentially to completion.

For the reasons stated above the Bielz et. al. teaching is fatally defective in that it neither teaches nor suggests applicants' invention. The failure of Bielz et. al. is not completed by Kesting. Applicants set out in their specification that Kesting and his co-inventor were concerned with producing chlorine dioxide, not a mixture of chlorine and chlorine dioxide as taught by applicants.

In view of the foregoing, it is respectfully submitted the rejection of claims 1-13, 21 and 38 under 35 U.S.C. 103(a) is not well taken and should be withdrawn.

It is submitted the Examiner has used applicant's teaching to not only select but to interpret the prior art which is clearly contrary to existing patent law.

In view of the foregoing and amendments and remarks, it is respectfully submitted the above-referenced application is in condition for allowance and a notice to that effect is earnestly solicited.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to

Deposit Account No.50-3841. If proper payment is not enclosed herewith, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-3841. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-3841.

Respectfully submitted,
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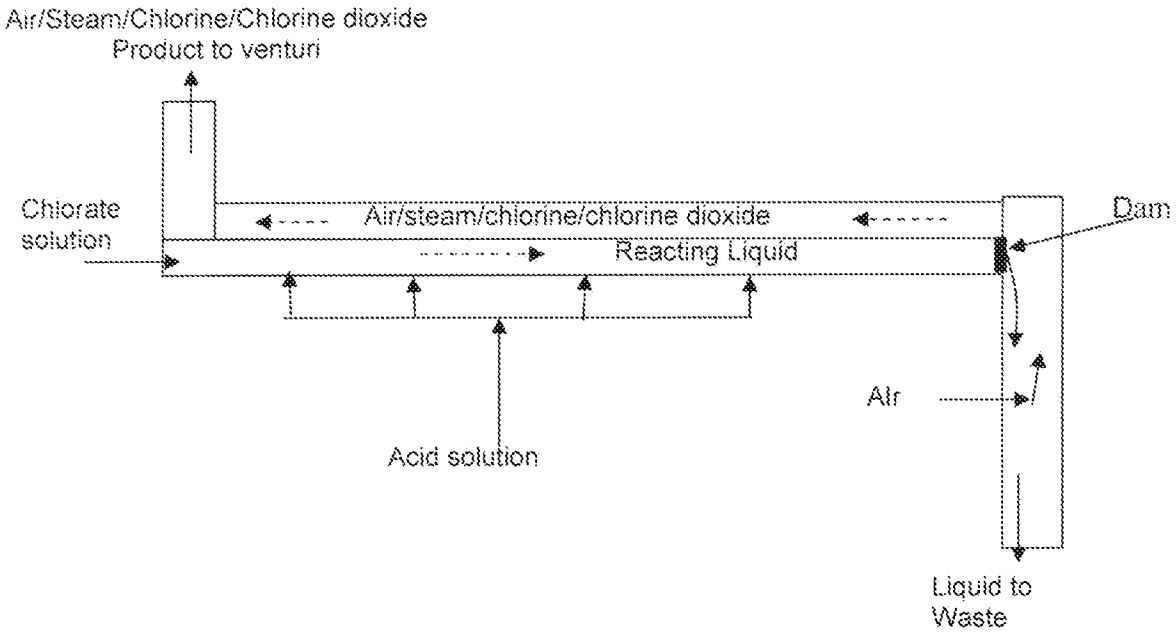
Appendix A

In a specific instance, a reactor comprises a horizontal pipe with inside diameter of 3 inches with one end terminating in an elbow turned upward and with a dam at the other end configured so that a pool of reacting liquid fills half of the cross section of the pipe over a length of 36 inches.

So



Sodium chlorate solution at a concentration of 47% by weight and at a temperature of about 70°C is fed into the end opposite the dam at a rate of 23.8 mL/min. Hydrochloric acid solution at 0.34 weight %, a temperature of 60°C and a rate of 77.7 mL/min is distributed equally to 4 injection points along the length of the reactor such that the first injection point is about 6 inches from the sodium chlorate feed point and the other injection points are spaced at intervals of about 4 inches. The reactor is heated to a temperature of 80°C using electrical band heaters clamped onto the outside of the reactor.

Liquid containing water, sodium chloride, unreacted sodium chlorate, and unreacted acid falls over the dam and is pumped to waste. The entire reactor is maintained at a slight vacuum of about one inch of mercury. This vacuum is produced by a venturi which draws the product stream into a stream of water where the chlorine dioxide and chlorine are dissolved and the steam condenses. As the reacting liquid flows through the reactor toward the dam, bubbles containing chlorine, chlorine dioxide, and steam rise to the surface of the liquid and are swept to the product withdrawal port by the air.

This system produces 20 pounds (0.3 lb moles) per day of chlorine dioxide and 34.6 pounds (0.49 lb moles) per day of chlorine. It consumes 49.87 pounds (0.44 pound moles) of sodium chlorate, of which 3.2 pounds (0.03 pound moles) is wasted. It

consumes 50.04 pounds per day (1.37 pound moles) of HCl of which 3.65 pounds (0.1 pound moles) is wasted.

In this specific reactor, 0.3 pound moles per day react in Reaction 1, and 0.14 pound moles per day of sodium chlorate react in reaction 2. By the definition of efficiency commonly used in describing the Day Kesting Process, this reaction is 68% efficient, which is far outside the range taught in the prior art. About 93% of the acid and 93% of the sodium chlorate is consumed in a single pass through the reactor. This is far more than is taught in the prior art.

If the reactor were made longer, or if it were operated at higher temperature, less reagent would be wasted, and the ratio of Reaction 1 to Reaction 2 would shift in favor of reaction 2.